

**SPECIFICATION:**

Please amend paragraph [0022] as follows:

[0022] FIG. 2 is a graph showing electrocatalytic polymerization followed by reduction with cyclic voltammograms of platinum phosphate blue recorded using a porous carbon, SCE, and Pt wire as working, reference, and auxiliary electrodes, respectively;

Please amend paragraph [0023] as follows:

[0023] FIG. 3 is a graph showing cyclic voltammograms of K.<sub>sub.3</sub>Fe(CN).<sub>sub.6</sub> recorded utilizing platinum wire and platinum coated carbon electrodes prepared by electrocatalytic polymerization and reduction of Platinum Phosphate blue;

Please amend paragraph [0024] as follows:

[0024] FIG. 4 is a graph showing cyclic voltammograms of K.<sub>sub.3</sub>Fe(CN).<sub>sub.6</sub> recorded utilizing platinum coated electrode or pure platinum wire as a working electrode prepared by electrocatalytic polymerization and reduction of Platinum Phosphate blue;

Please amend paragraph [0027] as follows:

[0027] Generally, the present invention provides a method of coating a carbon article with a metal, by cyclic voltammetrically electrodepositing electrocatalytic polymerization and reduction of the metal on the carbon article through cyclic voltammetry, thereby forming a metal coating on the carbon article. Also provided by the present invention, is the metal-coated carbon article made by the above method.

Please amend paragraph [0031] as follows:

[0031] The preferred method of electrodeposition through electrocatalytic polymerization and reduction (hereafter reductive electropolymerization) utilizes voltammetry. Voltammetry utilizes a simple potential waveform that is often used in electrochemical experiments, which is the linear waveform i.e., the potential is continuously changed as a linear function of time. The rate of change of potential with time is referred to as the scan rate (v). The simplest technique that uses this waveform is linear sweep voltammetry. The potential range is scanned in one direction, starting at the initial potential and finishing at the final potential. A more commonly used variation of the technique is cyclic voltammetry, in which the direction of the potential is reversed at the end of the first scan. Thus, the waveform is usually of the form of an isosceles triangle. The advantage is that the product of the electron transfer reaction that occurred in the forward scan can be probed again in the reverse scan. In addition, it is a powerful tool for the determination of formal redox potentials, detection of chemical reactions that precede or follow the electrochemical reaction, and evaluation of electron transfer kinetics.

Please amend paragraph [0034] as follows:

[0034] The method of the present invention provides for coating a carbon article with a metal complexes using reductive electropolymerization through cyclic voltammetry ~~cyclic voltammetric electrodeposition~~ or controlled reductive electropolymerization through cyclic voltammetry ~~potential-electrodeposition~~, thereby forming a metal coating on the carbon article. More specifically, the reductive electropolymerization electrodepositing step includes immersing the carbon article in a solution containing a polymerizable and reducible metal compound. The carbon article and the solution are then subjected to varying electrical potentials, the general principle of which is detailed above. For example, the carbon article and the solution are subjected to varying electrical

potential from about zero volts to about -1.0 volts with a rate of potential change of about 100 millivolts per second. The subjecting step is then repeated until the metal is formed of a sufficient thickness on a surface of the carbon article. The use of reductive electropolymerization through cyclic voltammetry for the electrodeposition of a metal enables an extremely thin coating to be deposited on a carbon article. For example, the metal coating can be deposited of a thickness that is less than about 0.1 mg/cm.<sup>2</sup> and most preferably less than 0.08 mg/cm.<sup>2</sup>, 0.05 mg/cm.<sup>2</sup>, and 0.03 mg/cm.<sup>2</sup>.

Please amend paragraph [0044] as follows:

[0044] FIG. 2 shows the deposition technique based on electrocatalysis leading to polymerization and reduction with cyclic voltammograms recorded by scanning the potential between 0 and -1.0 V for 20 cycles. Each complete cycle consists of a forward and a reverse scan. As can be seen from the diagram, there is a large change in current during the first four cycles. Subsequently, the changes in current from one cycle to the next decrease after several cycles, indicating the completion of electrode modification. In fact, very little change in current is seen after 10 cycles. Although the current did not change significantly after five cycles, platinum loading continues until it reaches saturation, which requires at least about 20 cycles. Amounts of platinum loaded on carbon surfaces, as determined by ion plasma coupled mass spectrometry (ICP-MS), are listed in Table 1. A uniform coating of the platinum on the carbon surface was observed following the cyclic voltammetry experiments. However, the effective surface area as determined in FIG. 6 is much larger than the geometric surface area of carbon articles. Accordingly, the actual platinum loading is lower than the values provided in Table 1 and in some instances the loading can be three times less for carbon articles. TABLE-US-00001 TABLE 1 Coated Platinum Contents on Carbon Surfaces Following Cyclic Voltammetry Platinum Loading mg/cm.<sup>2</sup> Carbon Rod/ Carbon Paper/ Carbon Rod/ Carbon Paper/ Carbon Paper/ No. Of Pt-Blue Pt-Blue K.<sub>sub.2</sub>PtCl.<sub>sub.4</sub> K.<sub>sub.2</sub>PtCl.<sub>sub.4</sub> K.<sub>sub.2</sub>PtCl.<sub>sub.4</sub> Cycles

(Stirring) (Stirring) (Without Stirring) (Without Stirring) (Stirring) 05 0.0448 0.0303  
-- 0.0401 0.1146 08 0.0889 -- -- -- 10 0.1198 0.0761 -- 0.0779 0.1838 15  
0.1810 0.1176 0.0910 -- 20 0.2158 0.1452 0.0980 0.1100 0.2058

Please amend paragraph [0046] as follows:

[0046] The platinum coated carbon electrode made according to this method-  
functions like an authentic platinum electrode as evidenced by the following  
experiments. First, cyclic voltammograms were recorded for the reduction of  
K.<sub>sub.3</sub>Fe(CN).<sub>sub.6</sub> using a platinum wire and platinum coated carbon electrode  
prepared from reductive electropolymerization as a working electrode. Identical  
voltammograms were obtained when the surface area of these two electrodes  
were equal as shown in FIG. 3. Furthermore, when a platinum coated carbon  
electrode was also used as an auxiliary electrode, the electrochemical system  
yielded voltammograms similar to those observed for platinum metal auxiliary  
electrode as shown in FIG. 4.